Claims

1 A coherent differential absorption lidar (DIAL) device comprising;

a transmit portion for directing a combined light beam, comprising at least two component light beams of discrete wavelengths, to a remote target and providing a local oscillator beam associated with each component light beam,

a receive portion for receiving light returned from the remote target and for coherently mixing the received light with its associated local oscillator beam,

characterised in that the device further comprises a signal correction means, the signal correction means comprising a means for extracting a portion of each component light beam from the transmit portion, a means for introducing a frequency difference between each extracted component light beam and its associated local oscillator beam and a means for directing the extracted beam into the receive portion.

2. A DIAL device according to claim 1, and further comprising a means for introducing a frequency difference between each of the at least two component light beams and the associated local oscillator beam.

3. A DIAL device according to any preceding claim wherein the combined light beam is routed through a fibre optic cable prior to transmission to the remote target.

4. A DIAL device according to any preceding claim wherein the transmit portion focuses light on the remote target using a first optical arrangement and the receive portion collects light from the remote target using a second, alternative, optical arrangement.

5. A DIAL device according to any preceding claim wherein each of the at least two component light beams is generated by a discrete laser source.

6 A DIAL device according to any one of claims 1-4 wherein the transmit portion comprises one laser source, a means for dividing the light beam output by the laser source into at least two component light beams and a means for introducing a frequency difference between said component light beams.

7. A DIAL device according to any preceding claim wherein one or more of the means for introducing a frequency difference comprises an acousto-optic modulator.

8 A DIAL device according to any preceding claim and further comprising at least one polarisation controller configured so as to control the polarisation state of the received light and/or the extracted component light beam with respect to the polarisation state of the associated local oscillator beam.

9 A DIAL device according to any preceding claim wherein the transmit portion further comprises at least one optical amplifier to amplify the intensity of one or more of the at least two component light beams.

10 A DIAL device according to any preceding claim wherein the signal correction means additionally comprises at least one delay line.

11 A DIAL device according to any preceding claim in wherein the wavelength of one of the at least two component light beams is selected to coincide with a peak in absorption of a gas species of interest.

12. A method of providing a normalisation signal in a coherent DIAL device comprising the steps of;

extracting radiation from the transmit path of the device,

introducing a frequency difference between the extracted radiation and associated local oscillator beam, and

inputting said frequency shifted radiation into the receive path of the device.

13. A DIAL device as hereinbefore described with reference to figures 1 to 3.